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Value of Thoracoscopic Lung Biopsy in Diagnosis of Diffuse Interstitial Lung Diseases

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Abstract

Background: Diffuse interstitial lung disease represent a diagnostic difficulty because the etiology is frequently unidentified. Lung biopsy may be necessary for the diagnosis, particularly in patients who do not suffer a well established underlying disease that comprises the lungs or have a well defined environmental exposure. Medical thoracoscopy for lung biopsy provides better inspection of the lung and allows more areas to be biopsied in contrast to the surgical biopsy that limit the choice of biopsy to the most accessible area.

Aim of the Study: To determine the diagnostic value of lung biopsy taken by thoracoscopy in diagnosis of different interstitial lung diseases.

Subjects and Methods: This study was conducted at Endoscopy Unit in Chest Department, Bab El-Sha'aria and Al-Hussin Hospitals, Al-Azhar University in the period between July 2015 to September 2017. Medical thoracoscopic lung biopsy using coagulation cup forceps was performed in forty patients with diffuse lung disease that is not specified after full clinical and investigational assessment.

Results: The diagnosis was obtained in all patients 100% of cases and the distribution of pathological diagnosis among patients was as the following idiopathic pulmonary fibrosis was diagnosed in 18 patients (45%), chronic hypersensitivity pneumonitis in 6 patients (15%), sarcoidosis in 5 patients (12.5%), non-specific interstitial pneumonia in 4 patients (10%), desquamative interstitial pneumonia in three patients (5%), silicosis in tow patients (5%), and finally adenocarcinoma in tow patients (5%). The mean duration for chest tube placement after thoracoscopy was 3.7 days. There was no complications in 37 (92.5%) of patients, three patients (5%) develop surgical emphysema and only one patient (2.5%) develop empyema.

Conclusion: Medical thoracoscopy using coagulation cup forceps biopsy technique is a simple procedure that can be performed safely under local anaethesia with spontaneous ventilation for diagnosis of diffuse interstitial lung diseases that remain undiagnosed after extensive investigations.

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Key Words: *Diffuse interstitial lung disease – Medical thoracoscopy – Lung biopsy.*

Introduction

ACUTE and chronic bilateral parenchymal diffuse pulmonary diseases with different degrees of tissue inflammation and fibrosis are totally referred to as Interstitial Lung Diseases (ILDs) when they occur in immunocompetent hosts after exclusion of infection and neoplasm [1]. Diffuse parenchymal lung disease still represent a diagnostic complexity. In a number of patients lung biopsy is necessary for the diagnosis, particularly in those who do not have an evident environmental exposure or any obvious disease that affect the lungs [2]. It is important to differentiate UIP from other histological subclasses of idiopathic interstitial pneumonia and from other interstitial lung diseases that have a better therapeutic response and a more favorable outcome [3]. A precise diagnosis can only be obtained through a lung biopsy. In contrast to the surgical intervention which limit the biopsy to the accessible field, thoracoscopy gives a better view of both the pleura and the lung allowing more areas to be biopsied. In the hands of will trained pulmonologist medical thoracoscopy with forceps biopsy is a safe maneuver and it can replace the surgical intervention in the diagnostic work up of diffuse parenchymal lung disease depending on the local expertise and institutional habits [4].

When encountering with a patient with very stiff or honeycomb lungs prolonged air leak is the most important minor complication that can be expected [4].

Aim of the work:

To determine the diagnostic value of lung biopsy taken by thoracoscopy in diagnosis of different interstitial lung diseases.

Subjects and Methods

This study was conducted in the Endoscopy Unit of the Chest Department Al-Azhar University Hospitals (Al-Hussein and Bab Al-Sharia) in the period between July 2015 to September 2017, and include forty patients with diffuse lung disease that is not specified after thorough clinical and investigational assessment.

All patients after giving written consent were subjected to the following:

- Clinical history and examination.
- Routine laboratory tests (CBC, liver and renal functions).
- CXR, Spirometry, HRCT chest, ABG and echocardiography.
- ANA, anti-DNA, and ANCA.

Exclusion criteria include:

Patients on mechanical ventilation, patients with contralateral pneumonectomy, bullous lung disease, pulmonary hypertension, patients with oxygen saturation less than 90% on room air by pulse oxymeter and those with coagulopathy.

Procedure: Medical thoracoscopy was performed in the Endoscopy Unit under local anesthesia with 2% lidocain and IV sedation with midazolam with spontaneous ventilation.

Patients were placed in the lateral decubitus with the hemithorax that is intended for lung biopsy placed upward, a pneumothorax was performed by introduction of about 600ml of air or less if patient can not tolerate using a smooth ended pleural needle. Then a 10-mm incision in the fourth or fifth intercostal space around the midaxillary line was made followed by blunt dissection until the pleural space is reached. The insulated cup biopsy forceps is then introduced through the single port thoracoscopy and dipped opened and perpendicularly into the lung parenchyma then closed. The lung biopsy was taken while pulling the forceps gently against the lung and applying a short pulses of coagulation diathermy over four to six seconds. About four to six biopsies was taken from the abnormal area and adjacent areas. Finally, a chest tube is inserted permitting the lung to expand.

Statistical analysis:

Statistical analysis was carried out using the SPSS computer package Version 21.0 (SPSS Inc., Chicago, IL, USA). For descriptive statistics: The mean ± Standard Deviation (SD)was used for quantitative variables while the number and frequencies (%) were used for qualitative variables. Chi square test (χ^2) or Fischer's Exact Test (FET) was used to assess the differences in frequency of qualitative variables while for quantitative variables, the independent samples *t*-test was used to compare between two means. Pearson correlation coefficient was used to correlate the study variables. The statistical methods were verified, assuming a significant level of $p<0.05$.

Results

Table (1): Mean age of the studied sample.

	Min	Max	Mean	SD
Age (years)	33	63	50.13	7.5

Table (2): Gender distribution of the studied sample.

	Frequency (n=40)	Percent (%)
Gender:		
Male	24	60.0
Female	16	40.0

Table (3): Special habits of the studied sample.

	Frequency (n=40)	Percent (%)
Special habits:		
Smoker	21	52.5
No	19	47.5

Table (4): Main complaint of the studied sample.

	Frequency (n=40)	Percent (%)
Main complaint:		
Cough	13	32.5
Dyspnea	26	65.0
Chest pain	1	2.5

Table (5): Predominant CT findings of the studied sample.

	Frequency (n=40)	Percent (%)
Predominant CT findings:		
Ground glass opacity	7	17.5
Reticulonodular	11	27.5
Reticulations	9	22.5
Nodules	9	22.5
Consolidation	4	10.0

Table (6): Duration of chest tube placement after thoracoscopy of the studied sample.

	Min	Max	Mean	SD
Duration of chest tube (days)	3	10	3.67	1.29

Table (7): Complications of the studied sample.

	Frequency (n=40)	Percent (%)
Complications:		
No	37	92.5
Empyema	1	2.5
Surgical emphysema	2	5.0

Table (8): Pathological results of the studied sample.

Pathological results	Frequency (n=40)	Percent (%)
Non specific interstitial pneumonia	4	10.0
Idiopathic pulmonary fibrosis	18	45.0
Chronic hypersensitivity pneumonitis	6	15.0
Desquamative interstitial pneumonia	3	7.5
Silicosis	2	5.0
Adenocarcinoma	2	5.0
Sarcoidosis	5	12.5

Discussion

This study includes forty patients with age ranged from (33-63) years and mean age of 50.3 years (Table 1), there was [24 males (60%) and 16 females (40%)] (Table 2) all of them have suffering from diffuse parenchymal infiltrates of undetermined etiology.

In the study performed by Morell et al., [5] and Jain et al., [6] the mean age was 49.2 years and 56.2 years respectively. In (Silva Cl study [7]) the mean age was 57.5 years.

In the study performed by Morell et al., [5] and El-Badrawy et al., [8] there was female predominance (55% and 53% respectively) while in the study performed by Jain et al., [6] and Danes et al., [9] there was a male predominance (64.6% and 66.4% respectively).

In the present study, 21 patients (52.5%) were smokers while 19 patients (47.5%) were non smokers (Table 3) and this is in agreement with the study performed by Ernst et al., [10] where 56% of cases were smokers, this signify that some types of diffuse interstitial lung diseases ILDs may be initiated by smoking which was also reinforced by Selman [11] who concluded that there is strong evidence that some types of diffuse interstitial lung diseases may be induced by smoking.

Current as well as former smokers are at great risk for development of Idiopathic Pulmonary Fibrosis (IPF) [12].

In this study the main complaint (Table 4) was dyspnea that was present in 26 patients (65%) followed by cough that was present in 13 patients (32.5%) and chest pain in one patient (2.5%). In the study performed by Ernsts et al., [10] dyspnea was present in 80.8% of patients while cough was present in 84.4% of patients. In the study performed by Xaubet et al., [13] cough was present in all cases while dyspnoea was present in 87% of cases. El-Badrawy et al., [8] found that dyspnea and cough were detected in all cases.

In the present study the patient who was complaining from chest pain was diagnosed as adenocarcinoma.

The dissimilarities in the proportion of patients presented by cough and dyspnea between this study and other studies could be interpreted by the different number of cases in each study as well as the unplanned selection of cases.

In this study the predominant HRCT findings (Table 5) was reticulonodular pattern that was found in 11 patints (%27.5%) followed by reticular pattern in 9 patients (22.5%) and nodular pattern in 9 patients (22.5%), followed by ground glass opacity in 7 patients (17.5%) and lastly consolidation in 4 patients (10%). In the study conducted by Xaubet et al., [13] the reticulations were present in 87.2% of patients while ground glass finding were present in 12.8% of patients. El-Badrawy et al., [8] reported that, the commonest finding was the nodular opacity that was detected in 36.7% of patients followed by ground glass opacification in 30% of patients, reticulonodularity in 23.3%, military shadow in 6.7% and lastly honeycombing in 3.3% of patients.

The precise etiology of underlying interstitial lung disease was determined in 100% of cases (Table 8), this is in agreement with the study performed by Boutin et al., [14] who reported his experience with 75 patients with diffuse or localized parenchymal disease in whom thoracoscopy was used to obtain pulmonary parenchymal specimens. A biopsy forceps was employed and effective hemostasis was achieved by electrocautery. The overall sensitivity was 92% ranging from 70% for peripheral lesions to 100% for diffuse diseases.

Marchandise et al., [15] performed medical thoracoscopic lung biopsies in 33 nonimunocompromised patients a diagnosis was obtained in 100% of cases. Also Bradly Rodgers reported a diagnostic success rate of 93% in patients with diffuse lung disease [16].

In the present study, idiopathic pulmonary fibrosis was diagnosed in 18 patients (45%), chronic hypersensitivity pneumonitis in 6 patients (15%),

sarcoidosis in 5 patients (12.5%), non-specific interstitial pneumonia in 4 patients (10%), desquamative interstitial pneumonia in three patients (5%), silicosis in tow patients (5%), and finally adenocarcinoma in tow patients (5%) (Table 8).

In the study conducted by Ewis et al., **[17]**, sarcoidosis was present in 40%, desquamative interstitial pneumonia in 30%, idiopathic pulmonary fibrosis in 15% and non-specific interstitial pneumonia in 15% of the patients.

Morell et al., **[5]** perform his study on 500 patients and he report that sarcoidosis was present in 18.6% of cases, malignancy in 10.8%, hypersensitivity pneumonitis in 15%, idiopathic pulmonary fibrosis in 16.8%, non-specific interstitial pneumonia in 3.8%, other IIPs in 18%, collagen diseases in 3.4%, pulmonary Langerhans cell histocytosis in 2.6%, and finally miscellaneous in 11% of cases. In the study conducted by Xaubert et al., **[13]** and include 511 patients, the commonest diagnosis was IPF in 38.6% of patients, sarcoidosis was found in 14.9%, hypersensitivity pneumonits in 6.6%, malignancy in 3.3%, collagen disease in 9.9%, pulmonary Langerhans cell histocytosis in 2.9%, NSIP in 1.7%, and other IIPs in 15.2% of patients. In another study conducted over 1382 patients and performed by Agostini et al., **[18]**, idiopathic pulmonary fibrosis was the commonest diagnosis and present in 37.6% followed by sarcoidosis in 29.2% patients, malignancy in 1.7%, hypersensitivity pneumonitis in 3.7%, non-specific interstitial pneumonia in 5%, collagn diseases in 1.3%, pulmonary Langerhans cell histocytosis in 6.6%, and miscellaneous in 14.9% of patients.

The dissimilarities in results betwwen this study and other studies can be explained by the large difference in number of patients in different studies.

In the present study the mean duration for chest tube placement after thoracoscopy was 3.7 days (Table 6) and this is in agreement with the study performed by Marchandise et al., **[15]** who reported a mean duration of 4 days. (Boutin et al., **[14]**) using the two entry technique with coagulation forceps, had an average length of chest tube drainage of 4 days and Dijkman **[19]** using single entry technique had an average of 4.6 days.

In the present study the complications were absent in 37 patient (92.5%) of patients, three patints (5%) develop surgical emphysema and only one patient (2.5%) develop empyema (Table 7) and this is in agreement with (Marchandise et al., **[15]**) who report that there was no severe complications in his study. The occurrence of surgical emphysema in this study is due to slipping of the tube after placement while the occurrence of empyema can be attributed to the poor general condition of the patient.

In the study performed by Boutin et al., **[14]** and included 75 patients, They reported a complications in the form of pneumothorax in 8 patients and low grade fever in 11 patients.

References

1- KING T.: Clinical Advances in the Diagnosis and Therapy of the interstitial Lung Diseases American Journal of Respiratory and Critical Care Medicine, 172: 268-79, 2005.

2- RAGHU G.: Interstitial lung disease. A diagnostic approach. Are CT scan and lung biopsy indicated in every patient? Am. J. Respir. Crit. Care Med., 151: 909-14, 1995.

3- American Thoracic Society/European Respiratory Society: International Multidisciplinary Consensus Classification of the Idiopathic Interstitial Pneumonias. Am. J. Respir. Crit. Care Med., 165: 277-304, 2002.

4- VANSTEENKIST J., VERBEKEN E., THOMEER M., et al.: Medical thoracoscopic lung biopsy in ILD a prospective study of biopsy quality Eur. Respir. J., 14: 585-90, 1999.

5- MORELL F., REYES L., DOMENECH G., GRACIA J., MAJO J. and FERRER J.: Diagnosis and diagnostic procedure in 500 consecutive patients with clinical suspicion of interstitial lung diseases: Arch. Bronconeumol., 44 (4): 185-91, 2008.

6- JAIN P., SANDUR S., MELI Y., ARROLIGA A.C., STOOLER J.K. and MEHTA A.C.: Role of flexible bronchoscopy in immunocompromised patients with lung infiltrates Chest, 125: 712-22, 2004.

7- SILVA C.I.1., MÜLLER N.L., HANSELL D.M., LEE K.S., NICHOLSON A.G. and WELLS A.U.: Nonspecific interstitial pneumonia and idiopathic pulmonary fibrosis: Changes in pattern and distribution of disease over time, 2008.

8- EL-BADRAWY M.F., FATHY A.M., AMIN M.M., ABOELLELA M.A. and EL-SAID A.R.: Transbronchial lung biopsy and bronchoalveolar lavage in diagnosis of bilateral diffuse pulmonary infiltrates. Egyptian Journal of Chest Diseases and Tuberculosis,Volume 56 No 3,4, 2006.

9- DANES C., GONZALES J.M., PUMAROLA T., RANO A., BENITO N., TORRES A., MORENO A., ROVIRA M. and PUIGE J.: Pulmonary infiltrates in immunosuppressed patients: Analysis of a diagnostic protocol. American Society for Microbiology, 40 (6): 2134-40, 2002.

10- ERNST A., HERSH C.P., HERTH F., et al.: Anovel instrument for the evaluation of the pleural space: An experience in 34 patients. Chest, 122 (5): 1530-4, 2002.

11- SELMAN M.: The spectrum of smoking related interstitial lung disorders. Chest, 124: 1185-7, 2003.

12- ANIL K., ELLA A., BARRY H., et al.: Smoking related ILDs. Radiologic clinical pathological correlation. Radio Graphics September, 28: 1383-96, 2008.

13- XUABET A., ANOCHEA J., MORELL, et al.: Report on the incidence of interstitial lung diseases in spain Sarcoidosis Vasc. Diffuse lung disease, 21: 64-70, 1998.

14- BOUTIN C., VIALLAT J.R., CARGNINO P., et al.: Thoracoscopic lung iopsy. Experimental and clinical preliminary study. Chest, 82: 44-8, 1982.

15- MARCHANDISE F.X., VANDENPLAS O., WALLON J. and FRANCIS C.: Thoracoscopic lung biopsy in interstitial lung disease. Acta Clin. Belg., 47 (3): 165-9, 1992.

16- LODDENKEMPER R., LEE P., NOPPEN M. and MATHUR P.N.: Medical thoracoscopy/pleuroscopy: Step by step. Breathe, December 2011, Volume 8, No 2, p. 157-66, 2011.

17- EWIS A., AHMED ABUNAGLA and HAMDY ZOAIR: Open lung biopsy in the evaluation of diffuse parenchymal lung disease, 2013.

18- AGOSTINI C., ALBERA C., BRAIFA F., HARARI S. and LUSUARDI M.: First report of the Italian register for diffuse infiltrative lung disorders. Monaldi Arch. Chest. Dis., 56: 364-8, 2001.

19- Dijikman J.H.: Thoracoscopy in the immunosuppressed patient Pneumologie, 43 (2): 116-8, 1989.

دور الخزعة الرئوية بإستخدام منظار الغشاء البللورى فى تشخيص آمراض آنسجة الرئة الخلالية المنتشرة

تعتبر آمراض آنسجة الرئة الخلالية المنتشرة من الصعوبات التى تواجه الآطباء فى التشخيص الطبى لمعرفة آسبابها وقد يتطلب الآمر آخذ عينات من الرئة لا سيما فى المرضى الذين ليس لديهم آى تاريخ مرضى يفسر هذا التغلغل المنتشر فى الرئتين. ويعتبر آخذ العينة الرئوية هو السبيل الآخير بعد إستيفاء كافة الفحوصات الطبية والتى تشتمل على التصاوير العادية والمقطعية عالية اللتباين على الصدر وكذلك التحاليل الطبية والموجات فوق الصوتية على القلب ثم المنظار الشعبى وما يتخلله من عمل غسيل شعبى وآخذ عينات من الرئة عبر الشعيبات الهوائية. وفى الوقت الذى تظهر فيه كافة الفحوصات الطبية دون جدوى تشخيصية فإنه يتحتم آخذ عينات من نسيج الرئة بشكل مباشر وهى الطريقة التى تضمن آعلى درجة من الدقة فى التشخيص.

هذا ويعتبر إستخدام المنظار الطبى للتجويف الصدرى من الطرق المميزة لآخذ عينات من نسيج الرئة حيث يتميز بكبر حجم العينة مقارنة بمثيلتها التى تؤخذ عبر الشعيبات الهوائية عن طريق المنظار الشعبى، ومقارنة بالطريقة الجراحية لآخذ عينات الرئة تحت تخدير عام فإن المنظار الطبى يعطى مجالا آكبر وآوضح فى الرؤية مما يعطى آفضلية آخذ العينة من آماكن مختلفة، كذلك تحديد الآماكن الآكثر تآثرا وآخذ عينات منها بشكل دقيق إضافة إلى آنه يتم إجرائه تحت تآثير مخدر موضعى متفاديا بذلك صعوبات التخدير العام وبفتحة فى جدار الصدر لا تتجاوز السنتيمتر الواحد.

وقد تبين من خلال هذه الدراسة آن إستخدام المنظار الطبى للتجويف الصدرى لآخذ عينات من الرئة بإستخدام الآلة المكبة التى تمكن من عمل الكى بعد آخذ العينة يعد من الوسائل الآمنة والفعالة فى تشخيص المرضى الذين يعانون من آمراض آنسجة الرئة الخلالية المنتشرة، ويوصى بإستخدام هذا الإجراء لتشخيص الحالات التى لم يتم تشخيصها بكافة الوسائل الآخرى.